SECTION 4: MANAGEMENT MEASURES

Section 4 Contents

Introduction

Management measures are the best available, economically achievable practices or combinations of practices that can be used to address nonpoint source pollution from marinas and recreational boating. *Best management practices* (BMPs) are individual activities or structures that can be used alone or in combination to achieve the management measures.

EPA identified 15 measures for implementation within state coastal management areas. From discussions with marina owners and operators at facilities on fresh waters nationwide, these 15 management measures and associated practices have been found generally to be just as applicable to freshwater marinas as to coastal water marinas. They form the basic measures recommended in this guidance. This section discusses the 15 management measures for marinas and recreational boating and BMPs that can be used to achieve them.

The scope of this guidance is broad, covering diverse nonpoint source pollutants from marinas and recreational boating. Because it applies to all types of waterbodies, it cannot provide all practices and techniques suitable to all regional or local marina or waterbody conditions. Also, BMPs are continually being modified and developed as a result of experience gained from their implementation and the innovation of marina owners and operators across the country.

The guidance can help marina managers identify potential sources of nonpoint source pollution and offer potential solutions. Finding the best solution to a nonpoint source pollution problem at a marina requires taking into account the many site-specific factors that together compose the setting of a marina and identifying the most applicable BMPs.

Considering management measures and BMPs during marina design will help to ensure that the site has good flushing and water circulation characteristics, avoid encroachment on vital

aquatic habitats, improve habitat quality in and around the marina basin, and reduce the potential for water quality problems in the marina basin. Considering pollution prevention possibilities when planning a marina can help ensure that the design of the marina and activities at the marina do not lead to degraded water quality in the basin once the marina is operational. Incorporating pollution prevention and source reduction measures into an existing marina can help improve and protect water quality at the marina. Good water quality can help any marina keep operational costs low and improve customer satisfaction.

Marina siting and design play important roles in determining how good water quality in a marina basin will be. Marina location (*open*—sited directly on a river, lake, bay, or barrier island, or *semi-enclosed*—sited on an embayment, cove, or other protected area) affects circulation in a marina basin and, therefore, how well it flushes. The depth of a marina basin affects circulation of deep water in the basin and how often it needs maintenance dredging, if at all. Dredging stirs contaminants from the bottom and can disturb bottom habitats. Marina design, especially the configuration of the basin and its orientation to prevailing winds, waves, tides, and currents, affects the retention of pollutants in a marina basin and the movement of pollutants out of a basin. Some marinas may be affected by storm water runoff from upland areas in the watershed.

Existing marinas can improve water and habitat quality in the marina basin through application of these management measures. Circulation and flushing may be improved in a marina basin by creating an additional opening in a breakwater. Shoreline stabilization may reduce the sedimentation rate and sediment levels in a marina basin, provide an area for patron activities, and make shoreline habitats more suitable for a variety of aquatic and terrestrial plants and animals. Improvements to storm water runoff patterns, fueling stations, sewage facilities, hull maintenance areas, or other areas or aspects of a marina where pollutants are generated can reduce pollutant inputs to the marina basin from these sources and improve water quality.

A marina designed with the important points of the management measures in mind—including physical location, flushing and circulation, aquatic habitat, shoreline stability, and pollution prevention—will probably have better water quality and fewer water-pollution-related problems during its life of operation, and economic benefits may result from making such improvements.[1] This applies whether the management measures are applied while the marina is being designed or incorporated into the marina after it is operational.

Subsections 4.1 through 4.15 of this section discuss each of the management measures. It is best to plan to apply management measures comprehensively by first evaluating pollution problems throughout the marina and incorporating those elements of different management measures that will most efficiently and effectively address the specific pollution issues at the marina. With a comprehensive approach to management measure application, any marina can achieve or maintain good water quality and maintain healthy shorelines and aquatic habitats.

In addition to the management measures, BMPs are also described. EPA has found the BMPs described in this guidance to be representative of the types of BMPs that can be applied successfully to achieve the management measures. Site-specific or regional circumstances, however, should be considered in the selection of BMPs for a particular marina. Circumstances such as type of adjacent waterbody, climate, and type of work performed at the marina affect the design constraints and pollution control effectiveness of BMPs. The list of practices for each management measure is not all-inclusive, and marina operators are encouraged to use other BMPs where they would be as effective as or more effective than those discussed in this guidance.

The management measures for marinas and recreational boating are applicable to the facilities and their associated shore-based services that support recreational boats and boats for hire. Generally, the following types of operations and facilities would be expected to benefit by use of

[1] See USEPA, 1996: *Clean marinas—Clear Value: Environmental and Business Success Stories*.

the management measures and BMPs in this guidance:

- Any facility that contains 10 or more slips, piers where 10 or more boats may tie up, or any facility where a boat for hire is docked.
- Boat maintenance or repair yards that are adjacent to the water.
- Any federal, state, or local facility where recreational boat maintenance or repair is done on or near the water.
- Public or commercial boat ramps.
- Any residential or planned community marina with 10 or more slips.
- Any mooring field where 10 or more boats are moored.

Facilities with fewer than 10 slips, where fewer than 10 boats are moored, or where piers have a capacity of fewer than 10 boats might also benefit from the management measures and BMPs described in this guidance, and operators of such facilities are encouraged to review the information presented here and consider its possible application to their situations.

Some of the management measures (e.g., marina flushing) are more applicable to the siting and design phase of marina construction or expansion, while others (e.g., maintenance of sewage facilities) concern marina operation and maintenance and are more applicable to operational marinas. Still others (e.g., storm water runoff) are applicable to all marinas, whether in the design phase, already operational, or in the process of expanding.

Following the discussion of each management measure and its associated BMPs is a table that restates the management measure and summarizes the environmental concerns that the management measure addresses, the BMPs applicable to the management measure, and information pertinent to the implementation of each BMP. The table that follows here, *Key to BMP Tables*, describes the type of content in each column in the tables. The tables (beginning with *BMP Summary Table 1*, p. 4-11) are organized as follows:

- The first column, *Best Management Practice Examples,* lists the BMPs mentioned in this guidance that can be used to achieve the management measure. Where appropriate, BMPs are divided by category, either pollution prevention or source reduction, as described in the *Key to BMP Tables.*
- The second column, *Marina Location & Usage*, identifies where in the marina the BMP would usually be located and the purpose for its use. The applicability of each BMP is categorized as universal, general, or recommended, as described in the *Key to BMP Tables.*
- The third column, *Benefits to Marina*, describes the benefits that marina owners and operators and boat owners at the marina could expect from using the BMP. The magnitude of the benefits is categorized as high, moderate, or low, as described in the *Key to BMP Tables.*
- The fourth column, *Projected Environmental Benefits*, describes the environmental benefits that can be expected from using the BMP. These are also categorized as high, moderate, or low, as described in the *Key to BMP Tables.*
- The fifth column, *Initial Cost Estimate*, is an estimate of the cost of initially installing the BMP (e.g., a structural BMP) or establishing the practice (e.g., a recycling program) at the marina. A cost range, as described in the *Key to BMP Tables*, is provided for each BMP.
- The sixth column, *Annual Operation & Maintenance Cost Estimate*, is an estimate of the ongoing cost, if any, of using or maintaining the BMP at a marina. The cost of annual operation and maintenance is estimated as for the initial cost estimate. See the *Key to BMP Tables.*
- The last column, *Notes,* provides descriptions of additional benefits or other information pertinent to the BMP.

KEY TO BMP TABLES: Title of Management Measure

MANAGEMENT MEASURE: The statement of the U.S. Environmental Protection Agency management measure.

APPLICABILITY: A statement of the general applicability of the management measure.

ENVIRONMENTAL CONCERNS: A descriptive statement of the potential environmental problems, what the pollutants could be, reason for concern, and how they could get into the water.

MANAGEMENT MEASURE PRACTICES

Best Management Practice Examples	Marina Location & Usage	Benefits to Marina	Projected Environmental Benefits	Initial Cost Estimate	Annual Operation & Maintenance Cost Estimate	Notes
Each best management practice (BMP) listed is a recommended example used successfully by marinas or boaters. Many of these practices are simple common sense. Not all practices are appropriate for each marina since each facility has site-specific needs. Managers can alter a practice to meet their site-specific situation as appropriate to achieve comparable benefits. In some marinas a single practice might be sufficient to achieve a result, and in others a combination of practices might be necessary. This list should not limit anyone from trying something new or different if it is cost-effective and practical and will help maintain or improve water quality.	This is a general description of where in the marina the practice is likely to be used. For example, a pumpout is where it is easiest for most boats to get service, such as on the fuel dock. A vacuum sander is used in the boat maintenance area. No-wake zones are present in the channels leading to or near the marina basin.	Use of this practice should provide clear benefits to the marina or boat owner for adoption to happen. Benefits may be economic, simple to use, available off the shelf, easily taught/learned, and effective. The benefits listed are typical and will help in determining which practice to select for the site-specific need.	A good practice has environmental benefits and improvements to clean boating. Each recommended practice has one or more environmental benefits for consideration. Although it is impossible to predict exact benefits everywhere, the most common found here will aid in selecting the most cost-effective practice. Use of any practice must predictably result in clear and measurable environmental protection or improvement in water quality.	Estimated cost ranges for the purchase, construction, and installation of each practice. Actual costs vary from site to site. The initial cost does not include the cost of applying for construction permits and legal services.	Estimated annual cost ranges for operating each practice and maintaining it in running condition for a reasonable use life. Actual costs vary from operation to operation.	Each practice has descriptions of additional benefits, effects, information, tips, advice, cautions, or comments to help select and use the technique for cleaner boating and marina facilities.

KEY TO BMP TABLES. (cont.) Title of Management Measure						
Best Management Practice Examples	**Marina Location & Usage**	**Benefits to Marina**	**Projected Environmental Benefits**	**Initial Cost Estimate**	**Annual Operation & Maintenance Cost Estimate**	**Notes**
Some BMPs are applied where products are used to prevent pollutants from being released into the water. They are often the first, best, least costly, and most effective practices to prevent contaminants from entering the water. BMPs of this type include not using a toxic solvent, diluting a product so it is less toxic, switching to a less or non-harmful product, or doing something differently so no pollution results. Education can teach people to change their behavior so they do things in a less polluting manner or to use methods that reduce the type or amount of contamination created.	Some BMPs may be appropriate for use in all or most marinas and boats, whereas others have limited usage. Select practices that are appropriate and cost-effective for each site-specific need. Every BMP will not work everywhere. Some could be broadly effective in many sites; others are less adaptable for wide or effective use.	HIGH = Considerable value to user; best cost/benefits when used. MODERATE = Of value to user; good cost/benefits from use. LOW = Some value; fewer cost/benefits to the user.	HIGH = Considerable environmental protection; clear and obvious water quality improvement can be expected. MODERATE = Protects the environment; improvement to water quality could be expected. LOW = Some protection to the environment; limited water quality improvement expected.	NONE = $0 LOW = under $2,000 MODERATE = $2,000 to 9,999 HIGH = $10,000 to 24,999 EXPENSIVE = $25,000+ When a range is given, e.g., High to Moderate, expect cost to lean toward higher end	NONE = $0 LOW = under $1,000 MODERATE = $1,000 to 4,999 HIGH = $5,000 to 9,999 EXPENSIVE = $10,000+ When a range is given, e.g., Low to Moderate, expect cost to lean toward lower end	

KEY TO BMP TABLES. (cont.) Title of Management Measure						
Best Management Practice Examples	**Marina Location & Usage**	**Benefits to Marina**	**Projected Environmental Benefits**	**Initial Cost Estimate**	**Annual Operation & Maintenance Cost Estimate**	**Notes**
Other BMPs are used to remove pollutants from the environment, and are applied between the place where pollutants are released and the water. These practices can capture, filter, screen, trap, contain, absorb, or chemically neutralize pollutants or divert them to municipal sewer lines. Recycling and use of a filter in a storm drain are examples. These BMPs often are more expensive to use and less effective than BMPs that reduce pollutant releases.	UNIVERSALLY RECOMMENDED Very effective practice for wide use; best choice; greatest cost/benefits; can be used in any marina (or on any boat) where applicable. GENERALLY RECOMMENDED Good practice for common use; effective choice; good cost/benefits; can be used in most marinas (or on most boats) where applicable. RECOMMENDED Practice for selected use, workable choice; reasonable cost/benefits; may be used in some marinas (or some boats) where better practices are not available or practical.					